

UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF ENTOMOLOGY  
FOREST INSECT INVESTIGATIONS

STATISTICAL REPORT OF SURVEY  
ON  
SOUTHERN OREGON - NORTHERN CALIFORNIA  
PINE BEETLE CONTROL PROJECT AREA  
DURING  
SEASON 1928

STATISTICAL REPORT NO. 7

by

F. P. KEEN  
Associate Entomologist  
U. S. Bureau of Entomology

450 Jordan Hall  
Stanford University  
Palo Alto, California  
January 15, 1929

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## PREFACE

To determine the trend of western pine beetle epidemics in the Southern Oregon-Northern California region and the effect of control operations, the annual surveys which were started in 1921 were continued during the 1928 season. Thirty check sections of 640 acres each, representing characteristic infestations in various parts of the area, were again cruised and the pine beetle loss for 1927 mapped and tallied.

The present report summarizes the results of the work so far as the current situation is concerned, while the influences affecting the trend of epidemics will be analyzed in later reports after a longer period of infestation has been studied.

Due to limited funds during the fiscal year 1928, the survey was not started until June 15. Beside the writer, three temporary assistants were employed. Mr. I.J. Hastings ran compass and took charge of the crew in the writer's absence, and Mr. Ernest Buck and Mr. Walter S. Greene spotted the beetle-killed trees. The survey of the Southern Oregon-Northern California area was completed on September 15, and then the crew took up the survey of the Happy Camp area on the Modoc National Forest.

The cost of the work was as follows:

Period: June 15 to September 15

Man-Days: 368

Salaries: Regular - \$875.00  
Temporary - 1080.00      \$1955.00

Expenses - - - - -      747.50

Total cost of survey - - - - - \$2702.50

Cost per man-day - \$7.35

Cost per acre cruised - \$0.15

## SURVEY DATA

### The Insects

The western pine beetle (Dendroctonus brevicomis Lec.) continues to be the agent responsible for the death of the major part of the insect-killed timber. The mountain pine beetle (Dendroctonus monticolae Hopk.), working in conjunction with the large engraver beetle (Ips emarginatus Lec.), succeeds in killing many small-diameter trees and trees of low resistance. The pine flatheaded borer takes third place, and is particularly active on pumice soils and dry rocky ridges where the trees suffer from drought.

### Resume of Past Losses

We now have ten years of loss records on this area, eight of which were secured by check cruises and the first two years by general estimates. The loss has run as follows:

Year	Volume Killed B.F.	Per cent of Stand Killed	
1918	255,500,000	2.0 %	Estimated
1919	191,500,000	1.5 %	"
1920	123,410,000	.97%	Cruised
1921	119,705,000	.94%	Control started
1922	104,975,000	.82%	"
1923	74,426,000	.58%	"
1924	129,355,000	1.01%	Control stopped
1925	252,880,000	1.98%	
1926	278,680,000	2.18%	
1927	261,860,000	2.05%	
Total 10 yrs.	1,792,291,000	14.03%	
Aver. per yr.	179,229,100 bd.ft.	1.40%	

### Present Insect Losses

As indicated in last year's report, a considerable portion of the area saw a further increase in infestation during the 1927 attacks. However, the increase was not uniform. On Area 1, with the exception of the Clover Station Unit, all units showed a decrease of from 15% to 20%, while the treated units showed a decrease of 45%. On Area 2, the Goodlowe and Royston Units showed slight increases, while the remainder of the area averaged a reduction of about 20%. On Area 3, the units surrounding the Sprague River Valley with the exception of the Deming Creek Unit showed a decrease, while the Horsefly and Crowder Flat Units showed a very heavy increase. The increase for the area as a whole amounted to about 15%. In general, then, the central and western portions of the project area decreased during 1927, while the eastern and southern portions increased. This increase was in line with the general increase which occurred in the Modoc areas adjoining this area on the south.

Although most of the area was cruised too soon to secure a check on the 1928 loss, the indications were that a decline was in progress throughout the entire region. Later this belief was supported by reports from the Klamath Forest Protective Association cruisers and the behavior of the infestation on the adjacent Modoc areas, which were under observation until late in the year. Just what factors are responsible for this decline it is difficult to say, but at least the improved growth condition of the trees has had an important bearing.

A very startling increase in loss occurred on the southern part of the Horsefly Unit. The check section in this locality broke all records on this project for severity of seasonal loss, with a total of 1316 trees killed in a year (1927). For several square miles through this fine stand of timber, the loss in apparently thrifty and young-to-middle-aged trees was tremendous. No explanation of the cause of this situation can be offered.

Other centers of heavy 1926 loss showed marked reductions in 1927. This can be explained as due to lack of enough suitable host material and the tendency of the beetles to move away from concentrations of their enemies. The shifting of epidemic centers, which is so marked in the cases of the Black Hills and mountain pine beetles, also occurs to a less degree with the western pine beetle. This tendency has probably not been emphasized in the past; but in studying the progress of the epidemics on the Southern Oregon area over a period of years the shifting tendencies are very noticeable. This does not necessarily mean that the beetles migrate for long distances, but rather that the tide of active infestation slowly moves from old centers of heavy killing into areas not recently thinned by an epidemic, until in the course of a few years the entire forest has been covered. Then the beetle activity will subside until the forest is ready for another thinning. In the last ten years the forests on this project have been swept by two such waves of insect activity. The crest of the wave, however, appeared in different units during different years.

#### Control Conducted During the Period

In addition to continuing the control program in Area 1, the Klamath Forest Protective Association secured the cooperation of the U.S. Forest Service and carried on a program of control in the Owens, Whitworth and Deming Creek Units of Area 3 during the year.

In the fall of 1927, on Area 3 the Klamath Forest Protective Association ~~discovered~~ 5,680 acres of the Whitworth and Owens Units and treated 2264 trees. At the same time the Forest Service put in a camp on the southern portion of the Owens Unit and covered about ten sections with control work, treating 1062 trees.

In the spring of 1928 the Association finished treating the northern portion of the Owans Unit, the remainder of the Whitworth Unit, and extended their operations to cover all of the heavily-infested portion of the Deming Creek Unit. Altogether 4467 trees were treated on 17,280 acres at a cost of about \$12,000. The Forest Service also put in a camp on the northwestern edge of the Quartz Valley Unit and treated 2,880 acres in that region.<sup>1</sup>

<sup>1</sup>See report by Lawrence Frizzell--"Report on Pine Beetle Control Work on the Fremont National Forest in the Spring of 1928", submitted June 21, 1928.

During the spring of 1928 the Association also treated the southern portions of the Jenny Creek and Pokegama Units of Area 1. In this work 1264 trees were treated, at a total cost of about \$6,200.

Table 1 gives a summary of the work conducted during these control campaigns.

#### Results of Control

The effect of the control work carried on by the Klamath Forest Protective Association during the fall of 1926 and spring of 1927 was noticeable in its effect upon the 1927 loss, which was tallied this season.

As shown in Table No. 2, the reduction in loss on the treated sections was 44.7%, while on the nearest untreated check sections the normal reduction was 16.8%. This leaves a reduction of 27.9% in the loss on treated areas as a direct result of the control work.

It is interesting to note that on the Clover Station section, which has been treated successively for three years, no additional reductions were secured in the last year's work.

Similar results have been secured on other areas, which tend to indicate that past a certain point infestations cannot be further reduced as long as there is considerable near-by active untreated infestation to act as a source of supply.

#### FUTURE WORK

##### Control Work

If the decrease in the winter loss of 1928 is general throughout the Southern Oregon area, the control program for 1929 can probably be very materially reduced. Only a few of the more active centers need to be watched.

The 1928 survey was carried on too early to be used as a basis for recommending the location and amount of control work to be undertaken. However, at the time of the survey the writer was impressed with the active nature of the infestation in the following

units:

Area 1. Clover Station Unit - central portion

Area 2. Sycan Unit - Northern and eastern portions  
(now being treated by Indian Service)

Gerber Unit  
(big increase in infestation as result  
of the 1927 fire)

Goodlowe Unit  
(steady increase since 1923)

Royston Unit  
(steady increase since 1923)

Area 3. Horsefly Unit - southern portion)  
(very heavy loss)

Merritt Creek -  
(loss not heavy but increasing since 1924)

Meryl Creek -  
(still active in belt at elevation of Rail  
Glade; now being treated by K.F.P.A.)

Quartz Valley  
(steady increase since 1924)

#### FUTURE STUDIES

Considerable data of value can be gained by continuing the surveys on the more typical check sections for a few more years. Logging is rapidly making inroads into the virgin timber, so that one by one the check sections are being eliminated from further study. At the present time only 28 check sections remain on which contiguous records have been kept since 1921.

The need at the present time is to have weather-recording stations located in at least three of the main yellow pine belts of southern Oregon and northern California, where detailed and continuous records could be secured of temperature, precipitation, barometric pressure, humidity, periods of cloudy weather, high wind etc., in order that these factors, as affecting both tree growth and resistance, as well as their effect upon the beetles themselves, could be more closely studied in connection with the trend of epidemics. Undoubtedly there are climatic factors of tremendous importance that are affecting these barkbeetle epidemics, and a knowledge of their action would do much toward giving us a basis for the prediction of beetle outbreaks.

TABLE NO. 1

CONTROL WORK CONDUCTED DURING PERIOD<sup>1</sup>  
FALL 1927 - SPRING 1928

Work by Klamath Forest Protective Association

Area	Control	Units	Trees	Volume	Acres	Cost
	Period	Treated	Treated	Treated	Covered	
1	Spring	Jenny Creek	248		3,160	
	1928	Pokegama	1,016		9,520	
		Total	1,264	1,707,728	12,680	\$6,274.48
2	Fall	Owens	592		2,640	
	1927	Whitworth	1,672		3,040	
		Total	2,264	1,770,596	5,680	\$8,841.53
3		Owens	1,549		5,920	
	Spring	Whitworth	250		920	
	1928	Deming	2,668		10,440	
		Total	4,467	4,184,435	17,280	\$12,104.03

Work by U.S. Forest Service

3	Fall 1927: Owens	1,062	829,270	6,760	\$5,631.39
	:Spr. 1928: Quartz Valley:	507	450,960	2,880	1,919.00
					7,550.39
	Total during Period	9,564	8,942,989	45,280	\$34,770.43

<sup>1</sup>Records supplied by courtesy of Klamath Forest Protective Association and U.S. Forest Service

TABLE NO. 2<sup>1</sup>

### Reduction in Loss Due to Control

Area:	Unit	Sections	Treated	Subsequent	
:	:		:1926 Loss:	1927 Loss	
:	:	:	:	:	
<u>Aspen Lake</u>	:T 37 S,R 7 E,Sec.34:	154	:	75	
:	:	:	:	:	
<u>Clover Station</u>	:T 38 S,R 6 E, "	36:	208	:	211
1	:	:	:	:	
<u>Johnson Prairie</u>	:T 39 S,R 5 E, "	7:	120	:	54
:	:	:	:	:	
<u>Round Lake</u>	:T 39 S,R 8 E, "	5:	442	:	172
:	:	:	:	:	
:	:		924	:	512

Reduction - 412 trees = 44.7%

### Trend of Infestation on Nearest Adjacent Check Sections

Area:	Unit	Sections	Untreated	Subsequent Loss
:	:		:1926 Loss	:1927 Loss
:	:	:	:	:
<u>Eagle Ridge</u>	:T 37 S,R 7 E,Sec.16:		201	165
:	:	:	:	:
<u>Clover Station</u>	:T 39 S,R 7 E, " 16:		181	292
:	:	:	:	:
<u>Jenny Creek</u>	:T 40 S,R 4 E, " 34:		359	163
:	:	:	:	:
<u>Pokegama</u>	:T 40 S,R 5 E, " 36:		326	268
:	:	:	:	:
			1,067	888

Reduction - 179 trees = 16.8%

<sup>1</sup>Data from check sections cruised by U.S. Bureau of Entomology

TABLE NO.3

Survey of 1928

## SUMMARY OF CRUISING DATA ON CHECK SECTIONS

Area 1

Unit	Location		Date	1926 Loss		1927 Loss		Remarks		
	Acres	Cruise		Total	Trees Marked	Total	Trees Marked	KW	Trtd	Total
	: T : R : Sec.:	:	: 1928 :	JS	JW:Trtd:	Total	KS	KW:Trtd:	Total	:
Aspen Lake	:37S: 7E: 34 :	640	: 7/12 :	89: 17:	48	: 154	: 41:	34:	0 :	75 :
Clover Station	:38S: 6E: 36 :	640	: 6/25 :	77: 33:	98	: 208	:100:	111:	0 :	211 :
"	:39S: 7E: 16 :	640	: 6/28 :	86: 95:	0	: 181	:155:	137:	0 :	292 :
Eagle Ridge	:37S: 7E: 16 :	640	: 7/10 :	78:123:	0	: 201	: 82:	83:	0 :	165 :
Jenny Creek	:40S: 4E: 34 :	640	: 6/18 :	183:176:	0	: 359	:114:	14:	35 :	163 :Tr.Spr.1928
Johnson Prairie	:39S: 5E: 7 :	640	: 6/22 :	46: 20:	54	: 120	: 39:	15:	0 :	54 :
Klamath Canyon	:41S: 6E: 9 :	160	: 7/ 6 :	77: 72:	0	: 149	: 75:	64:	0 :	139 :
Pokegama	:40S: 5E: 36 :	640	: 6/20 :	192:134:	0	: 326	:152:	35:	81 :	268 :Tr.Spr.1928
Round Lake	:39S: 8E: 5 :	640	: 7/ 2 :	281: 32:	129	: 442	:110:	62:	0 :	172 :
Total	:	:5280 :		:1109:702:329	:2140	:868:555:116	:1539 :			

	1926 Loss	1927 Loss	Reduction
Totals (untreated)	1216	1027	15.5%
" (treated)	924	512	44.6%

TABLE NO. 4

Survey of 1928

## SUMMARY OF CRUISING DATA ON CHECK SECTIONS

Area 2

Unit	Location	Acres	Cruise	Date of:		1926 Loss		1927 Loss		Remarks					
				T	R	Sec:	: 1928	: JS	: JW	: Trtd	: Tot.	: KS	: KW	: Trtd	: Tot.
Antelope	:36S: 8E: 28: 640	:	: 7/15	:	:	:	:	113:	188:	0 :	301:	133:	165:	0 :	298:
Chiloquin	:35S: 7E: 24: 640	:	: 7/17	:	:	:	:	43:	171:	0 :	214:	50:	58:	0 :	108: Logged 1924 & 1925
Ferguson	:35S:13E: 33: 640	:	: 7/23	:	:	:	:	344:	370:	0 :	714:	305:	181:	0 :	486:
Gerber	:38S:13E: 24: 640	:	: 8/15	:	:	:	:	298:	300:	0 :	598:	199:	311:	0 :	510: Burned Oct. 1927
Goodlowe	:39S:13E: 5: 640	:	: 8/13	:	:	:	:	78:	129:	0 :	207:	99:	163:	0 :	262:
Royston	:38S:12E: 10: 640	:	: 8/10	:	:	:	:	93:	189:	0 :	282:	144:	159:	0 :	303:
Sycan	:34S:12E: 2: 640	:	: 7/19	:	:	:	:	455:	828:	0 :	1283:	600:	386:	0 :	986:
Willow Flat	:37S:14E: 20: 640	:	: 8/ 8	:	:	:	:	432:	548:	0 :	980:	471:	463:	0 :	934:
Totals	:	:5120 :						:1856:	:2723:	0 :	:4579:	:2001:	:1886:	:	:3887

	1926 Loss	1927 Loss	Reduction
Total untreated	4579	3887	15.1%

TABLE NO.5

Survey of 1928

## SUMMARY OF CRUISING DATA ON CHECK SECTIONS

Area 3

Unit	:	:	:	Date of:	1926 Loss	:	1927 Loss	:	Remarks			
				: Location	: Acres	: Cruise	: Total Trees Marked	: Total Trees Marked				
	: T	: R	: Sec	: 1928	: JS	: JW	: Trtd	: Tot.	: KS	: KW	: Trtd	: Tot.
Crowder Flat	:47N:11E:18	:	640	: 9/ 7	: 233	: 347	: 0	: 580	: 476	: 560	: 0	:1036:
"	:47N:12E: 4	:	640	: 9/ 4	: 50	: 58	: 0	: 108	: 67	: 66	: 0	: 133:
Deming Creek	:36S:15E: 8	:	640	: 8/ 5	: 222	: 204	: 0	: 426	: 191	: 58:181	:	430:Trtd.Spring 1928
"	:36S:15E:25	:	640	: 8/ 7	: 102	: 155	: 0	: 257	: 149	: 29:118	:	296:
Horsefly	:38S:14E:13	:	640	: 8/21	: 489	: 300	: 0	: 789	: 387	: 304	: 0	: 691:
"	:38S:14E:36	:	640	: 8/17	: 411	: 386	: 0	: 797	: 638	: 678	: 0	:1316:
Merritt Creek	:33S:14E:34	:	640	: 7/26	: 96	: 102	: 0	: 198	: 102	: 107	: 0	: 209:
Meryl Creek	:35S:14E:11	:	640	: 7/28	: 283	: 399	: 0	: 682	: 265	: 342	: 0	: 607:
"	:35S:15E:20	:	640	: 8/ 1	: 271	: 248	: 0	: 519	: 215	: 252	: 0	: 467:
Owens	:38S:15E: 1	:	640	: 8/23	: 165	: 63	: 0	: 228	: 111	: 18	: 78	: 207:Trtd.Spr.1928
Quartz Valley	:36S:17E:7E $\frac{1}{2}$	:	320	: 8/29	: 54	: 68	: 0	: 122	: 119	: 100	: 0	: 219:
"	:38S:17E:8W $\frac{1}{2}$	:	320	: 8/30	: 65	: 108	: 0	: 173	: 99	: 174	: 0	: 273:
Whitworth Creek	:37S:16E:17	:	640	: 8/25	: 516	: 567	: 0	: 1083	: 433	: 77:438	:	948:Trtd.Fall 1927
Totals	:		:7680	:	:2957	:3005	: 0	:5962	:3252	:2765	:815	:6832:

Total untreated	1926 Loss	1927 Loss	Increase
	5962	6832	14.6%

TABLE NO. 6  
SUMMARY OF YELLOW PINE LOSSES FOR 1927

Area 1

Unit	No. of Trees Killed	Average per Tree	Volume M.B.M.	Stump Value \$	Value per Bd.Ft.	% of Stand	Loss per Acre	Trees Killed	Average per Sec.
Aspen Lake; 1,2,6	2,300	1,000	2,300	\$6.50	\$14,950	.84	136	87	
*Big Bend; 2,3	1,000	1,000	1,000	6.50	6,500	1.45	137	88	
*Chase Butte; 2,6	1,700	1,000	1,700	5.50	9,350	1.32	148	95	
Clover Sta.; 2,4,5,6	8,600	900	7,740	6.50	50,310	1.11	149	106	
Eagle Ridge; 1,6	2,900	1,000	2,900	7.50	21,750	1.49	162	101	
Jenny Creek; 2,7	3,900	900	3,510	5.50	19,305	.94	77	55	
Johnson Prairie; 6	3,200	1,400	4,480	5.50	24,640	.74	93	42	
Klamath Canyon; 3	2,100	600	1,260	3.50	4,410	2.14	112	119	
Pokegama; 2,7	8,900	900	8,010	5.50	44,055	1.02	163	116	
Round Lake; 1,2,6	2,900	1,000	2,900	6.50	18,850	1.30	158	101	
*Topsy; 3	3,200	1,000	3,200	6.50	20,800	1.27	126	80	
*Worden; 3	1,700	900	1,530	5.50	8,415	2.40	204	145	
	42,400	956	40,530	\$6.00	\$243,335	1.09	130	88	

\*Estimated but not cruised

Years in which loss was treated on different units are indicated as follows: (1) 1921;  
(2) 1922; (3) 1923; (4) 1924; (5) 1925; (6) 1926; (7) 1927.

TABLE NO. 7

## SUMMARY OF YELLOW PINE LOSSES FOR 1927

Area 2

Unit	No. of Trees Killed	Average per Tree	Volume M.B.M.	Stump Value	% of Stand	Loss per Acre	Average Bd.Ft. per Sec.	No. Trees Killed
*Algoma; 1	1,600	800	1,280	\$5.50	7,040	2.95	149	119
Antelope; 2	5,200	800	4,160	5.50	22,880	1.28	167	133
Black Hills; 3	17,700	700	12,390	4.50	55,755	2.34	331	304
*Bly	9,000	700	6,300	5.00	31,500	2.39	225	206
Chiloquin; 2	1,900	300	570	5.50	3,135	.26	26	56
Ferguson; 3	4,000	700	2,800	4.50	12,600	2.50	247	226
Gerber	2,000	600	1,200	4.00	4,800	3.96	211	225
Goodlowe	4,200	600	2,520	4.00	10,080	3.35	205	219
*Hildebrand; 3	4,000	600	2,400	5.50	13,200	1.40	141	150
*Rock Canyon; 3	5,000	600	3,000	5.00	15,000	1.94	246	263
Royston	5,600	600	3,360	4.50	15,120	1.96	277	295
*Saddle Mt.; 2	10,000	700	7,000	5.50	38,500	1.76	178	163
*Shoner	1,700	500	850	5.50	4,675	.81	69	88
*Sprague; 2	2,000	400	800	6.50	5,200	1.31	149	238
*Squaw Flat; 2	4,000	700	2,800	5.50	15,400	1.61	179	163
*Swan; 1	4,000	700	2,800	5.50	15,400	1.94	191	175
Sycan; 4	24,500	800	19,600	4.00	78,400	3.50	489	391
*Trout Creek; 2	8,000	700	5,600	5.50	30,800	1.56	163	149
*Whiskey Creek; 3	6,000	700	4,200	5.00	21,000	1.35	167	153
Willow Flat; 3	19,600	600	11,760	5.00	58,800	3.04	360	384
*Yainax; 3	3,700	700	2,590	5.50	14,245	1.37	165	150
Total	143,700	680	97,980	\$4.83	\$473,530	2.04	230	216

\*Estimated but not cruised

Years in which loss was treated on different units is indicated as follows: (1) 1921;  
(2) 1922; (3) 1923; (4) 1924

TABLE NO.8  
SUMMARY OF YELLOW PINE LOSSES FOR 1927

Area 3

Unit	No. of Trees Killed	Average Volume per Tree	Volume of Trees Killed	Stumpage Value per M.B.M.	Value of Stands per Acre	% of Stand Killed	Loss Bd.Ft.	Average Loss per Sec.	No. of Trees Killed
*Barnes Valley	: 12,300:	700	: 8,610:	\$3.50	:\$ 30,135:	2.45	: 198	:	181
Crowder Flat; 2,3	: 24,500:	900	: 22,050:	4.00	: 88,200:	2.51	: 242	:	172
Deming Creek; 2,4,7	: 9,100:	700	: 6,370:	5.00	: 31,850:	2.68	: 192	:	176
*Dog Lake	: 9,900:	800	: 7,920:	3.50	: 27,720:	2.05	: 149	:	119
*Four Mile	: 6,200:	800	: 4,960:	3.50	: 17,360:	1.60	: 128	:	103
*Hay Creek	: 4,900:	700	: 3,430:	3.50	: 12,005:	1.86	: 180	:	164
Horsefly; 1,2,3	: 27,400:	800	: 21,920:	5.00	: 109,600:	7.40	: 544	:	436
Merritt Creek	: 4,100:	800	: 3,280:	4.00	: 13,120:	2.28	: 150	:	120
Meryl Creek; 2	: 16,000:	800	: 12,800:	5.00	: 64,000:	2.50	: 202	:	162
Owens; 1,3,7	: 12,700:	900	: 11,450:	5.00	: 57,150:	3.50	: 298	:	212
Quartz Valley; 3,7	: 11,800:	800	: 9,440:	4.50	: 42,480:	3.19	: 281	:	225
*Scab Rock	: 9,200:	700	: 6,440:	3.50	: 22,540:	4.36	: 329	:	300
Whitworth Creek; 2,7	: 9,400:	500	: 4,700:	5.00	: 23,500:	2.58	: 137	:	176
	: 157,500:	782	123,350:	4.38	: 539,660:	2.91	: 233	:	190

\*Estimated but not cruised

Years in which loss was treated in different units is indicated as follows: (1) 1921;  
(2) 1922; (3) 1923; (4) 1924; (7) 1927

**TABLE NO.9**  
**PROJECT TOTALS**  
**SUMMARY OF YELLOW PINE LOSS FOR 1927**

Items	: Area 1 :	Area 2 :	Area 3 :	Total
Number of trees killed	: 42,400 :	143,700:	157,500:	343,600
Average volume per tree	: 956 :	680:	782:	762
Volume killed (M.B.M.)	: 40,530 :	97,980:	123,350:	261,860
Average value per M.B.M.	: \$6.00 :	\$4.83:	\$4.38:	\$4.81
Value of stumps lost	: \$243,335:	\$473,530:	\$539,660:	\$1,256,525
Per cent of stand killed	: 1.09%:	2.04%:	2.91%:	2.05%
Loss in board feet per acre	: 130:	230:	233:	206
Average number of trees killed per section:	88:	216:	190:	174

